

## ENU 4630: Fundamental Aspects of Radiation Shielding (3 Cr) - Fall 2015

---

INSTRUCTOR	<b>Dr. Leigh Winfrey</b> 170 Rhines Hall winfrey@mse.ufl.edu 352.273.0297
LECTURE	Mondays, 10:40 am - 12:35 pm, NSC 225 Wednesdays, 10:40 am - 11:30 am, NSC 225
OFFICE HOURS	1:00 pm - 2:00 pm Wednesdays in 170 Rhines Hall or by appointment.
PREREQUISITE	ENU 4605 - Radiation Interactions and Sources, with a minimum grade of C
REQUIRED TEXT	<i>Radiation Shielding</i> , Kenneth Shultis & Richard Faw, American Nuclear Society, 2002
COURSE DESCRIPTION	Basic principles of radiation shielding, and the study of radiation sources and shielding design for radiation facilities.
COURSE PURPOSE	Calculate the radiation shielding requirements for commonly encountered sources of photon, neutron, and charged particle radiations and integrate these calculations with materials and optimization parameters to design complete shielded structures for radiation facilities. By developing a complete understanding of the physical phenomena that occur as radiation is attenuated in materials, theoretical and numerical calculation techniques will be developed to predict the resulting radiation fields. Students will develop the ability to estimate uncertainties associated with the various approximation and empirical techniques for determining realistic radiation shielding requirements.
COURSE GOALS AND OUTCOMES	<p>Through this course students will develop additional knowledge and skills for students in the area of radiation shielding in order to achieve the following:</p> <p><b>Goals:</b></p> <ul style="list-style-type: none"><li>• Graduates will have successful careers as engineers</li><li>• Graduates will pursue advanced degrees or continuing education</li><li>• Graduates will communicate effectively and work collaboratively</li><li>• Graduates will use the knowledge and skills obtained in their undergraduate education to practice high ethical and professional standards in engineering.</li></ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"><li>• Provide students with the ability to apply advanced mathematics, computational skills, science and engineering science, including atomic and nuclear physics, to identify, formulate, analyze, and solve nuclear and radiological engineering problems</li><li>• Provide students with a knowledge of the fundamentals of radiation transport, interactions, and detection and with the principles required for the analysis, design, and safe operation of radiation producing and using equipment and systems.</li><li>• Provide students with the ability to design and conduct experiments and analyze and interpret data using current experimental, acquisition, and analysis techniques.</li><li>• Provide students with the skills needed to communicate effectively, work collaboratively, and understand their professional and ethical responsibilities and the impact of engineering solutions in a societal and economic context so they can pursue successful, productive careers in nuclear and radiological engineering.</li></ul>

COURSE COMMUNICATION      Communication from the instructor will come in class, via email and through the course **Canvas** site, found at <https://lss.at.ufl.edu/>.

ATTENDANCE POLICY      There is no attendance requirement, however students are encouraged to regularly attend class.

CANCELLATION POLICY      Barring emergencies, the instructor will give students prior notice of cancelled classes and office hours. Should an emergency situation occur, the instructor will attempt to notify the class as soon as possible. Office hours that are cancelled in advance will be covered or rescheduled. Notifications of class or office hour cancellation will come via email.

GRADING POLICY      A 10 point grading scale will be used for this course. Detailed information on University of Florida Grading Policies may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Range	Grade	Range	Grade
95 - 100	A	73 - 76	C
90 - 94	A-	70 - 72	C-
87 - 92	B+	67 - 69	D+
83 - 86	B	63 - 66	D
80 - 82	B-	60 - 62	D-
77 - 79	C+	0 - 60	E

Assignments and exams will be weighted as follows:

- 30% Homework Assignments
- 30% Quizzes
- 20% Project One
- 20% Project Two

Partial credit will be given on all assignments, projects, and quizzes unless otherwise specified. Errors in calculating a student's grade for an assignment, project, or quiz will be corrected promptly if they occur.

Re-grading or re-assigning points on a homework assignment, project, or quiz will be made at the discretion of the instructor. To receive a re-grade, students must return the assignment or examination to the instructor within two business days of receiving the graded work and include a brief written explanation of the requested re-grade; ***the entire assignment will be re-graded*** and returned to the student no sooner than two days after re-submission.

HOMEWORK      The student is responsible for all material in the reading assignments from the text even if not covered in class. Homework assignments will be posted on Canvas and announced in class. Students may conduct homework and study sessions in groups. However, each person must ***independently*** write up and submit his or her own work. Copying is not permitted. It is the student's responsibility to ensure homework is legible; at the discretion of the instructor ***unreadable homework may receive no credit***.

All homework is due at the beginning of class; homework received after the start of class will be considered late. Late homework will be accepted up to 5:00 PM on the day after

the due date. Late homework may be turned in either to the instructor in person or to the instructor's box (104 Rhines Hall). **Late homework may receive a 10% grade penalty.** Makeup homework or late homework turn-in in the event of illness or travel can be arranged on discussion with the instructor; this should be arranged prior to the due date when possible.

**PROJECTS** Students will be formed into groups of approximately 4 people for each project. The first project will involve characterization of a radiation source and shielding. Groups will make short presentations and turn in a technical report. The date of the presentations will be determined once the project has been assigned, approximately the 3rd week of class. The first second project will involve human-radiation dosing or the environmental release of radioactive material. Again, 4 person groups will be assigned, a technical report will be required, and presentations will be made during the final exam period, Friday, December 18, 2015, 10:00 am - 12:00 pm.

**QUIZZES** Announced quizzes will be given approximately every other week. All quizzes will be closed book and closed notes with the calculator policy specified at the time of the announcement. Quizzes and their topics will be announced in class and on Canvas at least one class period in advance, but students may generally assume that quizzes cover the most recent home work and previous week's lectures.

Makeup quizzes will be given under limited circumstances. Excused absences consist of university-sanctioned absences, or other justified absences, verified and approved by the instructor. If the absence or conflict is known in advance, the student must notify the instructor prior to the quiz, and **rescheduling must take place prior** to be counted as an excused absence.

**HONOR CODE** The University of Florida Policy on Academic Misconduct will be observed and strictly enforced. Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the **UF Student Honor Code** found at <http://www.dso.ufl.edu/students.php>.

**SPECIAL REQUIREMENTS** Any student with special needs, disabilities, or requiring accommodations should schedule a meeting with the instructor to discuss his or her needs as soon as possible.

Further, from the University of Florida Policy on Accommodating Students With Disabilities, students requesting accommodation for disabilities must first register with the **Dean of Students Office** found at <http://www.dso.ufl.edu/drc/>. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

**CHANGES IN THE SYLLABUS** This syllabus represents current plans and objectives. As the semester progresses, those plans may need to change to enhance the class. Such changes will be communicated clearly, are not unusual and should be expected.